

Notice No.2

Rules and Regulations for the Classification of Special Service Craft July 2018

The status of this Rule set is amended as shown and is now to be read in conjunction with this and prior Notices. Any corrigenda included in the Notice are effective immediately.

Please note that corrigenda amends to paragraphs, Tables and Figures are not shown in their entirety.

Issue date: November 2018

Amendments to	Effective date	IACS/IMO implementation (if applicable)
Part 10, Chapter 1, Sections 2 & 13	1 January 2019	N/A
Part 15, Chapter 1, Sections 4 & 8	1 January 2019	N/A
Part 15, Chapter 4, Sections 1 & 10	1 January 2019	N/A
Part 16, Chapter 2, Section 10	1 January 2019	1 January 2019



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Part 10, Chapter 1

Reciprocating Internal Combustion Engines

■ Section 2

Materials and components

2.2 Testing and inspection

2.2.1 Except where Pt 10, Ch 1, 2.2 Testing and inspection 2.2.3 applies, Materials and components for engines are to be manufactured, and tested and documented in accordance with the relevant requirements of the *Rules for the Manufacture, Testing and Certification of Materials*, July 2018 and Table 1.2.1 Summary of testing and associated documentation for engine components.

2.2.3 2.2.2 Where an alternative approach for product assurance has been approved by LR quality scheme is in place (see Pt 5, Ch 1, 1.3 Alternative approach for product assurance), the testing and documentation requirements in Table 1.2.1 Summary of testing and associated documentation for engine components will be in accordance with a specific LR quality scheme certification schedule identifying the tests, intervention requirements and associated documentation including types of certificates that are to be issued.

- (a) Testing and inspection identified as requiring LR engagement in Table 2.2.1 Summary of testing and associated documentation for engine components may be carried out and documented by the manufacturer in accordance with the approved alternative approach for product assurance.
- (b) Any agreed variation to the requirements given in Table 2.2.1 Summary of testing and associated documentation for engine components is to be included within the alternative approach for product assurance scheme certification schedule.

2.2.2 2.2.3 All The testing and inspection in Table 1.2.1 Summary of testing and associated documentation for engine components is to be documented by manufacturer's certificate the manufacturer (e.g. manufacturer certified materials testing or manufacturer issued NDT report as applicable), see Pt 5, Ch 2, 2.2 Testing and inspection 2.2.8 except where LR engagement intervention is explicitly required.

2.2.6 2.2.5 The manufacturer is not exempted from responsibility for any relevant tests and inspections of those parts for which documentation is not explicitly requested by LR.

2.2.7 2.2.6 Where Table 1.2.1 Summary of testing and associated documentation for engine components states that a test report is required, this is to be issued by the manufacturer and provided for review by the Surveyor. The report is to identify the samples from current production that have been tested and inspected to confirm that the component complies with all applicable requirements.

2.2.8 2.2.7 Where a manufacturer's certificate document (test certificate or NDT report) is required in Table 1.2.1 Summary of testing and associated documentation for engine components, this is to be issued by the manufacturer and provided for review by the Surveyor. The certificate document is to comply with the requirements of the *Rules for the Manufacture, Testing and Certification of Materials*, July 2018, Ch 1, 3.1 General 3.1.3(c) or Ch 1, 5.5 Non-destructive examination reports 5.5.1 as applicable.

2.2.5 2.2.8 Components and materials not specified in Table 1.2.1 Summary of testing and associated documentation for engine components or of novel design will be specially considered upon submission of their details.

Table 1.2.1 Summary of testing and associated documentation for engine components

Part	Material properties see Note 2	Non-destructive examination	Hydraulic testing see Note 4	Dimensional inspection see Note 3	Visual inspection-see Note 5	Applicable to engines	Final document to be issued
Welded bedplate	C + LR(M) W (C + M)	UT + CD W (UT + CD)	-	-	LR-(V) fit-up + post-welding	All	LR Component Certificate
Bearing transverse girders (cast steel)	C + LR(M) W (C + M)	UT + LR(CD) W (UT + CD)	-	-	LR(V)	All	LR Component Certificate
Welded frame box see Note 65	C + LR(M) W (C + M)	UT + CD W (UT + CD)	-	-	LR(V) fit-up + post-welding	All	LR Component Certificate
Cylinder block (cast iron grey cast iron or spheroidal graphite cast iron)	LR(M)	-	LR W (P) see Note 76	-	-	Crosshead	W Hydraulic Test Certificate
Welded cylinder frames see Note 65	C + LR(M) W (C + M)	UT + CD W (UT + CD)	-	-	LR(V) fit-up + post-welding	Crosshead	LR Component Certificate
Engine block (grey cast iron)	LR(M)	-	LR W (P) see Note 76	-	-	>400kW/cylinder	W Hydraulic Test Certificate

Engine block (spheroidal graphite cast iron)	W (M)		W (P) see Note 6			>400kW/cylinder	W Material Properties Certificate W Hydraulic Test Certificate
Cylinder liner	C + LR(M) W (C + M)	-	LR W (P) see Note 76	-	-	B>300mm	W Material Properties Certificate W Hydraulic Test Certificate
Cylinder head (cast iron grey cast iron or spheroidal graphite cast iron)	LR(M)	-	LR W (P)	-	-	B>300mm	W Hydraulic Test Certificate
Cylinder head (cast steel)	C + LR(M) W (C + M)	UT + LR(CD) W (UT + CD)	LR W (P)	-	LR(V)	B>300mm	LR Component Certificate
Cylinder head (forged)	C + LR(M) W (C + M)	UT + LR(CD) W (UT + CD)	LR W (P)	-	LR(V)	B>300mm	LR Component Certificate
Piston crown (cast steel) see Note 9	C + LR(M) W (C + M)	UT + LR(CD) W (UT + CD)	-	-	LR(V)	B>400mm	LR Component Certificate
Piston crown (forged)	C + LR(M) W (C + M)	UT + LR(CD) W (UT + CD)	-	-	LR(V)	B>400mm	LR Component Certificate
Crankshaft (one piece)	LR(C + M)	UT + LR(CD) W (UT + CD)	-	D W	LR(V) (Random, of fillets and oil bores)	All	LR Component Certificate
Semi-built crankshaft (Gcrankthrow, forged main journal and journals with flange)	LR(C + M)	UT + LR(CD) W (UT + CD)	-	D W	LR(V) (Random, of fillets and shrink fittings)	All	LR Component Certificate
Exhaust gas valve cage	LR(M)	-	LR W (P)	-	-	Crosshead	W Hydraulic Test Certificate
Piston rod	LR(C + M)	UT + (CD) W (UT + CD)	-	-	LR(V) (Random)	B>400mm	LR Component Certificate
Crosshead pin	LR(C + M)	UT + (CD) W (UT + CD)	-	-	LR(V) (Random)	Crosshead	LR Component Certificate
Connecting rod with cap	LR(C + M)	UT + LR(CD) W (UT + CD)	-	D W	LR(V) (Random, of all surfaces in particular those shot peened)	All	LR Component Certificate
Crankshaft coupling bolts	LR(C + M)	UT + CD W (UT + CD)	-	D W	LR(V) (Random, of interference fit)	All	LR Component Certificate
Bolts and studs for cylinder heads, crossheads, main bearings and connecting rods see Note 109	C + LR(M) W (C + M)	UT + CD W (UT + CD)	-	TR [thread making for connecting rods]	-	B>300mm	W Material Properties Certificate W Non- Destructive Examination Report W Test Report
Tie rod see Note 1110	C + LR(M) W (C + M)	UT + CD W (UT + CD)	-	TR [thread making]	LR(V) (Random)	Crosshead	LR Component Certificate
High pressure fuel injection system – valve and pump body (pressure side) see Notes 12, 13, 11 and 1214 and 15 see Note 8	LR(C + M)	-	LR W (Lesser of P or p+30 MPa)	-	-	All B>300mm	LR Component Certificate see Note 8
			TR			B≤300mm	

			(Lesser of P or p+30 MPa)				
High pressure fuel injection pipes including common rail see Notes 14-11, 14 and 15	LR(C + M) see Note 8	-	LR W (Lesser of P or p+30 MPa)	-	-	All B>300mm	LR Component Certificate see Note 8
			TR (Lesser of P or p+30 MPa)			B≤300mm	
High pressure common servo oil system see Notes 14 and 15	LR(C + M) see Note 8	-	LR W (Lesser of P or p+30 MPa)	-	-	All B>300mm	LR Component Certificate see Note 8
			TR (Lesser of P or p+30 MPa)			B≤300mm	
Coolers, both sides see Notes 14 and 1613	LR(C + M) see Note 8	-	LR W (P)	-	-	B>300mm	LR Component Certificate see Note 8
Accumulator of common rail fuel or servo oil system see Note 14	LR(C + M) see Note 8	-	LR W (Lesser of P or p+30 MPa)	-	-	Accumulators with a capacity >0,5l	LR Component Certificate see Note 8
Piping, pumps, actuators, etc., for hydraulic drive of valves, if applicable see Note 14	LR(C + M) see Note 8	-	LR W (P)	-	-	>800kW/cylinder	LR Component Certificate see Note 8
Engine-driven pumps (oil, water, fuel, bilge) see Note 14	LR(C + M) see Note 8	-	LR W (P)	-	-	>800kW/cylinder	LR Component Certificate see Note 8
Bearings (main, crosshead, and crankpin) see Note 1714	TR [C]	TR [UT]	-	D W	LR(V) -	>800kW/cylinder	TR Material Properties TR Non- Destructive Examination Report W Inspection Certificate

SYMBOLS:

B = Bore dimension, refers to engine cylinder bores	p = Maximum working pressure of item concerned
C = Chemical composition analysis	P = Pressure test at 1,5p
M = Mechanical property analysis	V = Visual examination of accessible surfaces
UT = Ultrasonic testing (see Note 1)	LR () = Test/inspection to be certified by LR except where Pt 5, Ch 2, 2.2 Testing and inspection 2.2.5 applies.
CD = Crack detection by MPI or DPT (see Note 87)	TR[] = Test report required for process in brackets (see Pt 5, Ch 2, 2.2 Testing and inspection 2.2.7 2.2.6)
D = Dimensional inspection, including surface condition W () = Test/inspection to be certified by manufacturer	

Note 1. Ultrasonic testing is not required for components manufactured from cast iron.

Note 2. Material properties include chemical composition and mechanical properties, as identified in the table above. Where mechanical testing is required this is to include testing of surface treatment, such as surface hardening (hardness, depth and extent), peening and rolling (extent and applied force) as applicable. Mechanical tests are to be conducted after the final heat treatment has been applied.

Note 3. Dimensional inspection, is to includeing assessment of surface condition.
Note 4. Hydraulic testing is applied on the water/oil side of the component. The full lengths of cooling spaces are to be tested, where applicable. Where design or testing features may require modification of these test requirements, special consideration may be given.
Note 5. Certificates issued for visual inspection, either following satisfactory survey or under an approved LR Quality Scheme, are to be considered as component certificates
Note 65. Where welding is carried out, welding and welder qualifications are to be carried out in accordance with the <i>Rules for the Manufacture, Testing and Certification of Materials, July 2018, Ch 12 Welding Qualifications</i> .
Note 76. Hydraulic testing is also required for those parts filled with cooling water and having the function of containing the water which is in contact with the cylinder or cylinder liner.
Note 87. Magnetic particle testing is to be carried out on ferro-magnetic materials, penetrant testing is only to be carried out on non-ferritic materials. Visual examination alone is not considered insufficient. Magnetic particle and dye penetrant testing are to be carried out when the forgings are in the finished machined condition.
Note 98. Where the piston rod seals the piston crown cooling space, it is to be tested after assembly. Where piping systems and components are categorised as Class III, the testing for material properties shall be W(C + M) as a minimum. For materials documentation requirements, see <i>Pt 15, Ch 1, 11 Material certificates</i> . A Hydraulic Test Certificate or Test Report will also form as part of Final Document to be Issued.
Note 109. See also <i>Rules for the Manufacture, Testing and Certification of Materials, July 2018, Ch 5, 3.5 Non-destructive examination 3.5.1</i> for detailed non-destructive examination requirements for other bolts and studs.
Note 110. Magnetic particle testing of tie rods may be confined to the threaded portions and the adjacent material over a length equal to that of the thread.
Note 1211. Where components are subjected to an autofrettage process accepted by LR (see <i>Pt 5 10, Ch 2 1, 2.4 Autofrettage</i>), the component pressure test may be omitted. The assembled system containing such components is to be shown, where practicable, to be pressure-tight as required for hydraulic systems.
Note 1312. Pumps used in jerk or timed pump systems only need to have the assembled high pressure containing components hydraulically tested.
Note 14. See also <i>Pt 5, Ch 2, 8 Piping</i> . Material certification requirements for pumps and piping components are dependent on the operating pressure and temperature. Requirements given in this Table apply except where alternative requirements are explicitly given in <i>Pt 5, Ch 12 Piping Design Requirements</i> and <i>Pt 5, Ch 14 Machinery Piping Systems</i> .
Note 15. Where an alternative approach for product assurance approved by LR is in operation, components for engines with a bore of 300mm or less may be supplied with test reports (as described in <i>Pt 5, Ch 2, 2.2 Testing and inspection 2.2.7</i>) instead of test certificates for pressure testing and materials tests, see <i>Pt 5, Ch 2, 2.2 Testing and inspection 2.2.3</i> .
Note 1613. Material and component certification for accumulators or coolers which are classed as pressure vessels are dependent on the operating pressure and temperature, see <i>Pt 5 15, Ch 11 4, 1.5 1.4 Classification of fusion welded pressure vessels</i> and <i>Pt 5 15, Ch 11 4, 1.7 1.3 Materials</i> . Charge air coolers are only to be tested on the water side.
Note 1714. Ultrasonic testing is required to prove full adhesion between basic base material and bearing metal.

■ Section 13

Air compressors

13.4 Design and Construction

(Part only shown)

13.4.2 The diameter, d_b , of a compressor crankshaft is to be not less than d , determined by the following formula, when all cranks on the shaft are located between two main bearings only:

$$d = V_c \left(\frac{D^2 p Z}{7,85} \left(\frac{S}{16} + \frac{ab}{a+b} \right) \right)^{1/3} \text{ mm}$$

p = design pressure, in bar MPa g , as defined in *Pt 15, Ch 1, 4.1 Design symbols 4.1.1*

13.7 Crankcase relief valves

13.7.2 Crankcases are to be provided with lightweight spring-loaded valves or other quick-acting and self-closing devices to relieve the crankcases of pressure in the event of an internal explosion and to prevent any inrush of air thereafter. The valves are to be designed and constructed to open quickly and be fully open at a pressure not greater than $0,2 \text{ bar}$ $0,02 \text{ MPa}$.

Part 15, Chapter 1

Piping Design Requirements

■ Section 4

Design symbols and definitions

4.1 Design symbols

(Part only shown)

4.1.1 The symbols used in this Chapter are defined as follows:

p = design pressure, in bar MPa, see Pt 15, Ch 1, 4.2 Design pressure

p_t = hydraulic test pressure, in bar MPa

■ Section 8

Plastic pipes

8.3 Design strength

8.3.2 The nominal internal pressure, p_{Ni} , of the pipe is to be determined by the lesser of the following:

$$\begin{aligned} p_{Ni} &\leq \frac{p_{st*}}{4} & p_{Ni} &< 2,5 p_{st} \\ p_{Ni} &\leq \frac{p_{lt*}}{2,5} & p_{Ni} &< 4 p_t \end{aligned}$$

where

p_{st} = short term hydrostatic test failure pressure, in bar MPa

p_{lt} = long term hydrostatic test failure pressure (100 000 hours), in bar MPa

Failure pressures obtained over a reduced period and extrapolated in accordance with a recognised National or International Standard will be specially considered.

8.3.4 The nominal external pressure, p_{Ne} , of the pipe, defined as the maximum total of internal vacuum and external static pressure head to which the pipe may be subjected, is to be determined by the following:

$$p_{Ne} \leq \frac{p_{col}}{3}$$

where

p_{col} = pipe collapse pressure, in bar MPa

Part 15, Chapter 4 Pressure Plant

■ Section 1 General requirements

1.2 Details to be submitted

1.2.1 Plans of pressure vessels are to be submitted in triplicate for consideration where all the conditions in (a) or (b) are satisfied:

(a) The vessel contains vapours or gases, e.g. air receivers, hydrophore or similar vessels and gaseous CO₂ vessels for fire-fighting, and

$$pV > 600 \text{ bar}$$

$$p > 4 \text{ bar}$$

$$V > 100 \text{ litres}$$

V = volume (litres) of gas or vapour space

p = design pressure (bar)

(b) The vessel contains liquefied gases, or flammable liquids, and

$$p > 7 \text{ bar}$$

$$V > 100 \text{ litres}$$

V = volume (litres)

p = design pressure (bar)

1.4 Classification of fusion welded pressure vessels

1.4.2 Fusion welded pressure vessels are graded as Class 2/1 and Class 2/2 if they comply with the following conditions:

(a) where the design pressure exceeds 47,2 bar 1,72 MPa, or
(b) where the metal temperature exceeds 150°C, or
(c) where the design pressure, in bar MPa, multiplied by the actual thickness of the shell, in mm exceeds 457 15,7, or
(d) where the shell thickness does not exceed 38 mm.

■ 1.7 Definition of symbols

(Part only shown)

1.7.1 The symbols used in the various formulae in Pt 15, Ch 4, 2 *Cylindrical shells subject to internal pressure*, unless otherwise stated, are defined as follows and are applicable to the specific part of the pressure vessel under consideration:

p = design pressure, in bar MPa, see Pt 15, Ch 4, 1.5 *Design pressure*

■ Section 10 Hydraulic tests

10.1 Fusion welded pressure vessels

(Part only shown)

10.1.1 Fusion welded pressure vessels are to be tested on completion to a pressure, p_T , determined by the following formula, without showing signs of weakness or defect:

$$p_T = 1,3 \frac{\sigma_{50}}{\sigma_T} \frac{t}{(t - 0,75)} p$$

but in no case is to exceed

$$1,5 \frac{t}{(t - 0,75)} p$$

where

p = design pressure, in bar MPa

p_T = test pressure in bar MPa

Part 16, Chapter 2 Electrical Engineering

- **Section 10
Converter equipment**

10.1 Transformers

10.1.11 When oil-immersed transformers are used, there is to be monitoring for low oil level with an alarm when pre-set limits are crossed. There are to be arrangements so that the load may be reduced to a level commensurate with the cooling available.

Existing paragraphs 10.1.11 and 10.1.12 have been renumbered 10.1.12 and 10.1.13.

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Published by Lloyd's Register Group Limited
Registered office (Reg. no. 08126909)
71 Fenchurch Street, London, EC3M 4BS
United Kingdom

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